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EXAMINER	
DASTOURI, MEHRDAD	
ART UNIT	PAPER NUMBER
2623	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/760,052	RAJAGOPAL ET AL.	
	Examiner	Art Unit	
	Mehrdad Dastouri	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-43 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-10, 14-17, 19, 21-44 is/are rejected.

7)☒ Claim(s) 11-13,18 and 20 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 12 January 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2,3.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 14-18 are objected to because of the following informalities:

In Line 4 of Claim 14, ";" should be corrected to ".". Claims 15-18 depend on Claim 14.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 21 recites the limitation "said providing additional N-M candidate signals" in Lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 15 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites providing additional N-M values for the at least one of said initial set of candidate signals, thereby generating said set of candidate signals, wherein each one of said set of candidate signals comprises N values. By providing additional N-M values for some of the initial set of candidate signals, each one of said set of candidate signals will not have N values.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3-10, 14, 22-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Hibbard (U.S. 6,249,594).

Regarding Claim 1, Hsu discloses a computer-implemented method for determining a "best match" of an input signal of interest from a set of candidate signals, wherein two or more of the candidate signals are uncorrelated, the method comprising:

determining a unified signal transform from the set of candidate signals (Figures 4A-4F; MAP Objective Functions, Fourier Elliptic transformation; Column 12, Lines 11-35);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate signals (Column 17, Lines 62-67, Column 18, Column 19, Lines 1-54; Column 22, Lines 8-59);

receiving the input signal of interest (Figures 4A-4F; Column 22, Lines 61-67, Column 23, Lines 1-6. The input signals of interest are synthetic pictures in which the boundary (black) to be contoured.);

applying the unified signal transform for the at least one generalized frequency to the input signal of interest to calculate a corresponding at least one generalized frequency component value for the input signal of interest (Figures 4-6; Column 23, Lines 7-64);

determining a best match between the at least one generalized frequency component value of the input signal of interest and the at least one generalized frequency component value of each of the set of candidate signals (Figures 4-6; Column 23, Lines 7-67, Column 24, Column 25, Lines 1-15)4); and

outputting information indicating a best match candidate signal from the set of candidate signals (Figures 4-6; Tables 1 and 2).

Regarding Claim 3, Hibbard further discloses the method of Claim 1, wherein the unified signal transform includes a set of basis functions which describe an algebraic structure of the set of candidate signals Column 18; Formulas (28) and (29), sine and cosine basis functions of Fourier series).

Regarding Claim 4, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to convert each of the set of candidate signals to a generalized frequency domain (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 5, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to convert each of the set of candidate signals into a representation of generalized basis functions, wherein the basis functions represent the

algebraic structure of the set of candidate signals (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 6, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to decompose the signal into generalized basis functions, wherein the basis functions represent the algebraic structure of the set of candidate signals (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 7, all of the candidate signals (signals used as reference) are conventionally obtained from a random population and consequently are uncorrelated with each other.

Regarding Claim 8, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals are one of 1-dimensional signals, 2-dimensional signals, or 3-dimensional signals (Column 5, Lines 66-67, Column 6, Lines 1-15).

Regarding Claim 9, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals are of a dimensionality greater than 3 (Column 16, Formulas (16) through (22). The image signal has at least four dimensions comprising of gray-level intensity, gradient, and coordinates x, y for each pixel.

Regarding Claim 10, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals comprise one or more of image data, measurement data, acoustic data, seismic data, financial data, stock data, futures data, business data, scientific data, medical data, insurance data, musical data, biometric data, and telecommunications signals (Column 1, Lines 11-16. The input

signal of interest and the candidate signals comprise of image data, measurement data, scientific data and medical data.).

Regarding Claim 14, initial candidate signals inherently comprises of N candidate signal (there are at least Two signals, i.e., N=2), wherein at least one of said initial set of candidate signals comprises a set of M values, wherein M is greater or less than N (each initial candidate signal have at least one value, i.e., M=1).

With regards to Claim 19, arguments analogous to those presented for Claim 14 are applicable to Claim 19.

With regards to Claim 26, arguments analogous to those presented for Claim 1 are applicable to Claim 26.

With regards to Claim 27, arguments analogous to those presented for Claim 3 are applicable to Claim 27.

With regards to Claim 28, arguments analogous to those presented for Claim 4 are applicable to Claim 28.

With regards to Claim 29, arguments analogous to those presented for Claim 5 are applicable to Claim 29.

With regards to Claim 30, arguments analogous to those presented for Claim 6 are applicable to Claim 30.

Regarding Claim 31, Fourier transformation is a unified signal transformation.

With regards to Claim 32, arguments analogous to those presented for Claim 7 are applicable to Claim 32.

With regards to Claim 33, arguments analogous to those presented for Claim 8 are applicable to Claim 33.

With regards to Claim 34, arguments analogous to those presented for Claim 9 are applicable to Claim 34.

With regards to Claim 35, arguments analogous to those presented for Claim 10 are applicable to Claim 35.

With regards to Claims 38, 39 (A digital image is comprised of pixel data which are the candidate data set), 43 and 44, arguments analogous to those presented for Claim 1 are applicable to Claims 38, 39, 43 and 43.

6. Claim 42 is rejected under 35 U.S.C. 102(e) as being anticipated by Gross et al (U.S. 6,240,372).

Regarding Claim 42, Gross et al disclose a computer-implemented method for determining a "best match" of an input telecommunications signal of interest from a set of candidate telecommunications signals, wherein two or more of the candidate telecommunications signals are uncorrelated, the method comprising:

determining a unified signal transform from the set of candidate telecommunications signals (Abstract);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate telecommunications signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

receiving the input telecommunications signal of interest (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

applying the unified signal transform for the at least one generalized frequency to the input telecommunications signal of interest to calculate a corresponding at least one generalized frequency component value for the input telecommunications signal of interest (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

determining a best match between the at least one component value of the input telecommunications signal of interest and the at least one component value of each of the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14); and

outputting information indicating a best match candidate telecommunications signal from the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14).

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 40 is rejected under 35 U.S.C. 102(b) as being anticipated by Nakajima et al (U.S. 5,915,034).

Regarding Claim 40, Nakajima et al disclose a computer-implemented method for determining a "best match" of an input biometric signal of interest from a set of candidate biometric signals, wherein two or more of the candidate biometric signals are

uncorrelated (Set of candidate biometric signals (Facial features) are collected from different people and are consequently uncorrelated), the method comprising:

determining a unified signal transform from the set of candidate biometric signals (Figure 4, Step S408);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate biometric signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate biometric signals (Figure 4);

receiving the input biometric signal of interest (Figures 4 and 9A);

applying the unified signal transform for the at least one generalized frequency to the input biometric signal of interest to calculate a corresponding at least one generalized frequency component value for the input biometric signal of interest (Figures 4 and 9A);

determining a best match between the at least one component value of the input biometric signal of interest and the at least one component value of each of the set of candidate biometric signals (Figure 10); and

outputting information indicating a best match candidate biometric signal from the set of candidate biometric signals (Figure 2).

9. Claim 41 is rejected under 35 U.S.C. 102(b) as being anticipated by Nishiya et al (U.S. 5,109,431).

Regarding Claim 41, Nishiya et al disclose a computer-implemented method for determining a "best match" of an input stock history waveform of interest from a set of

candidate stock behavior waveforms, wherein two or more of the candidate stock behavior waveforms are uncorrelated (Column 2, Lines 43-59), the method comprising:

determining a unified signal transform from the set of candidate stock behavior waveforms (Figures 1, 2 and 3c; Column 2, Lines 51-68, Column 3, Lines 1-8);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate stock behavior waveforms to calculate a corresponding at least one generalized frequency component value for each of the set of candidate stock behavior waveforms (Figures 1, 2 and 3c; Column 2, Lines 51-68, Column 3, Lines 1-8);

receiving the input stock history waveform of interest; applying the unified signal transform for the at least one generalized frequency to the input stock history waveform of interest to calculate a corresponding at least one generalized frequency component value for the input stock history waveform of interest (Figures 1-6; Column 2, Lines 51-68, Column 3, Lines 1-40);

determining a best match between the at least one component value of the input stock history waveform of interest and the at least one component value of each of the set of candidate stock behavior waveforms (Figures 12 and 13); and

outputting information indicating a best match candidate stock history waveform from the set of candidate stock behavior waveforms (Figure 10; Column 14, Lines 3-6).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 2, 22-25, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hibbard (U.S. 6,249,594).

Regarding Claim 2, Hibbard does not explicitly disclose further limitations recited in Claim 1.

Limitations recited in Claim 2 comprising:

subtracting each of the respective at least one generalized frequency component values of each candidate signal from the at least one generalized frequency component value of the input signal of interest (calculating the distance between an N-dimensional vector representing the input pattern and the N-dimensional reference vectors of a particular class in an N-dimensional pattern recognition space); and determining a smallest difference between each of the respective at least one generalized frequency component values of each candidate signal and the at least one generalized frequency component value of the input signal of interest; wherein a candidate signal corresponding to the smallest difference is the best match candidate signal (classification of the patterns based on the minimum distance between input pattern vector and reference vectors) are the conventional template matching methodology routinely implemented in the art.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Hibbard's invention to incorporate further limitations recited in Claim 2 because it is a standard methodology routinely implemented in

pattern recognition to identify the best match between the input and reference patterns (signals, images, etc.).

Claims 22-25, 36 and 37 recite limitations such as displaying the information on a display screen, storing the best match candidate signal in a memory medium of a computer system, processing the best match candidate signal to determine if the best match candidate is an acceptable match and processing the best match candidate signal to determine characteristics of the received input signal of interest. These are well known methodology routinely implemented in image processing and pattern recognition for manipulating the digital image data.

Allowable Subject Matter

12. Claims 11-13, 18 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 of the instant invention recites the method of Claim 1, wherein said determining a unified signal transform for the set of candidate signals comprises:

forming a matrix B from all of the values of the candidate signals, wherein each of the candidate signals comprises a corresponding column of the matrix B;

defining a matrix B, wherein the matrix B comprises a column-wise cyclic shifted matrix B;

defining a matrix A, wherein the matrix A comprises a cyclic shift matrix operator, wherein multiplying matrix A times matrix B performs a column-wise cyclic

shift on matrix B, thereby generating matrix B, wherein AB = B', wherein $A = B'B^{-1}$, wherein B^{-1} comprises an inverse matrix of matrix B, and wherein A^N = an NxN identity matrix, I;

performing a Jordan decomposition on $A = B'B^{-1}$, thereby generating a relation $A = X_B \Lambda X_B^{-1}$, wherein X_B comprises a matrix of normalized columnar eigenvectors of matrix B, wherein A comprises a diagonal matrix of eigenvalues of matrix B, and wherein X_B^{-1} comprises an inverse matrix of matrix X_B; and

calculating matrix X_B^{-1},wherein the matrix X_B^{-1} comprises the unified signal transform.

Claims 12 and 13 depend on Claim 11, and are therefore allowable.

Claim 18 of the instant invention recites the method of Claim 14, wherein M is less than N, the method further comprising: fitting a curve to the M values for the at least one of said initial set of candidate signals;

sampling the curve to generate N values for the at least one of said initial set of candidate signals, thereby generating said set of candidate signals, wherein each one of said set of candidate signals comprises N values.

Claim 20 of the instant invention recites the method of Claim 19, the method further comprising:

providing an additional N-M candidate signals to said initial set of candidate signals, thereby generating said set of candidate signals, wherein said set of candidate signals comprises N candidate signals, and wherein each one of said set of candidate signals comprises N values.

13. Claims 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and overcome the 112 second paragraph rejection set forth in the Office Action.

Claim 15 of the instant invention recites the method of Claim 14, wherein M is less than N, the method further comprising:

providing additional N-M values for the at least one of said initial set of candidate signals, thereby generating said set of candidate signals, wherein each one of said set of candidate signals comprises N values.

Claims 16 and 17 depend on Claim 15, and are therefore allowable.

Other prior art cited

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,404,920 to HSU;

U.S. Patent 6, 137,896 to Chang et al.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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